financially by those who take an interest in this big problem. The subject, we know, is still in its infancy; but it is hoped that those who wish that this country should take some part in this problem of aerial navigation should bear a hand and support those who are willing to carry out the necessary experiments.

WILLIAM J. S. LOCKYER.

THE CALCUTTA EARTHQUAKE.

IN a previous number of NATURE (June 24, vol. lvi. p. 174), Mr. T. Heath gave an account, *re* the Indian earthquake, of the oscillations set up in the bifilar pendulum of the Edinburgh Observatory between the times June 11, 23h. 18m., and June 12, 0h. 33m. The reproduction of the photographic record accompanying the letter did not, however, show any of the minor details of the effect produced. We have received a communication from Prof. P. Blaserna, in which these details are clearly depicted on the records obtained with the instruments erected at the Royal Geodetic Observatory of Rocca di Papa (Rome). The curves here shown illustrate the movements of the N.-S. (Fig. 1), and the E.-W. (Fig. 2) components of a horizontal pendulum, and show better than any description the increase and decrease in the length of swing of the pendulum at the times (intervals of ten minutes) indicated by the short arrows. We may mention that a second set of curves, made with another quite independent instrument (seismometograph with a vertical pendulum carrying a mass of 200 kilograms), recorded nearly similar disturbances at the same times. This latter instrument is also situated at Rocca di Papa, and directed by Dr. A. Cancani. The above curves, besides indicating the effect produced by the shocks caused by the Calcutta earthquake, show how very efficient the Roman instruments are for recording the minute details of the earth's movements.

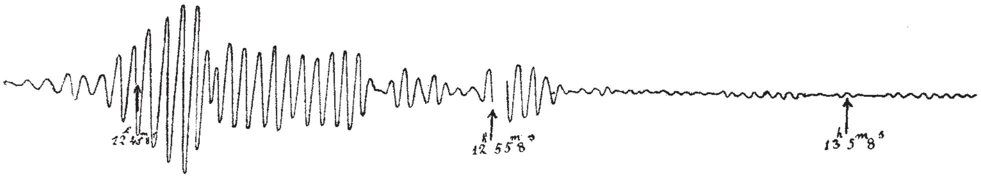

FIG. 1.—June 12, N.-S. component.

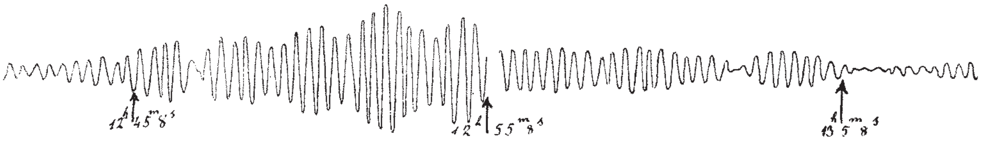

FIG. 2.—June 12, E.-W. component.

NOTES.

THERE seems some probability that Jamaica may be selected by the American Commission for the site of the proposed Tropical Botanical Station. Profs. MacDougal and Campbell have restricted themselves in their tour of investigation to that island, and have expressed themselves as well satisfied with the conditions of the rich and varied vegetation there found. The Director of the Botanical Department, Mr. W. Fawcett, is prepared to render every assistance in the furtherance of the object.

THE Scientific Society of Argentina is organising a Congreso Cientifico Latino Americano, to be held at Buenos Ayres in April next, in commemoration of the twenty-fifth anniversary of its foundation. The Congress will be under the patronage of the President of the Argentine Republic and the Ministers of Justice, Foreign Affairs, and Public Instruction. There will be seven sections, dealing respectively with exact sciences (pure and applied mathematics, astronomy, geodesy and topography), engineering, physics and chemistry, natural science, medical sciences (including hygiene and climatology), anthropology and sociology.

M. HAUTEFEUILLE, member of the Section of Mineralogy of the Paris Academy of Sciences, has been promoted to the rank of Officer of the Legion of Honour. M. J. Vinot has been made a Chevalier of the Legion of Honour.

PROF. WM. LIBBEY, JUN., of Princeton, has succeeded in making the ascent of the Mesa Encantada, near Albuquerque, New Mexico, by the use of a cannon and life-line. The line was thrown over the *mesa*, and successively larger cords were attached, till after two days' labour a rope of sufficient strength to raise a man in a chair was in position. No archæological remains were discovered, except rocks piled up as if man had perhaps piled them. Tradition ran that the *mesa* had been inhabited until the means of access were swept away four centuries ago.

THE Paris correspondent of the *Times* states that Dr. Robert Wurtz, professor at the Paris School of Medicine, has been chosen, as one of the leading French bacteriologists, for a mission in Abyssinia. He is to start for Jibutil and to go on direct to Adis Abeba, where, after having organised a department of vaccination, he will study the rinderpest and similar infectious maladies which chronically ravage Menelik's empire.

THE death is announced of Dr. W. Petzold, known by his contributions to geographical and astronomical literature.

WE regret to announce the death of Prof. Victor Meyer, the distinguished professor of chemistry in the University of Heidelberg.

THE Government of Victoria is offering a bonus of 1000*l.* for the invention of an efficient and not too costly method of ventilating mines.

THE Belgian Chamber of Representatives has voted an additional grant of sixty thousand francs in aid of M. de Gerlache's expedition to the South Pole.

THE statue of Charles Darwin, erected in his native town of Shrewsbury and in front of the school which for nine years he attended, was unveiled on Tuesday. The statue, which is of bronze, is the gift of the Shropshire Horticultural Society, and cost 1000 guineas.

THE thirty-fourth annual conference of the British Pharmaceutical Association was opened at Glasgow on Tuesday, under the presidency of Dr. Symes, of Liverpool.

Owing to the advance of areas of low barometric pressure over our islands from the Atlantic since the beginning of the month, the weather, which for a considerable period had been very fine, under the influence of an anti-cyclonic system, became very unsettled, and thunderstorms were experienced in nearly all parts. The reports issued by the Meteorological Office show that some high temperatures were registered: on the 4th and 5th, readings of 90° (in shade) were recorded in the east of England, and 88° in the southern parts of the country. On the latter day rain fell heavily over the northern parts; at St. Helens (in Lancashire) 2·28 inches were measured in three-quarters of an hour. The disturbance on Sunday, the 8th inst., caused further thunderstorms and rainfall in the southern parts of the country, 0·8 inch being measured at Oxford and 0·7 inch in London. This is the heaviest fall in London in one day since January 8 last.

About this time every year the Société Industrielle de Mulhouse issues a "Programme des Prix" to be awarded in the following year. The list of prizes to be awarded in 1898 has just been received, and it contains no less than 144 prize-subjects. No useful purpose would be served by describing all these subjects, but attention may profitably be called to the following among them:—5000 francs for discoveries or inventions which in the preceding ten years have been most useful to industries in the district of the Upper Rhine; a medal and 1000 francs for the best memoir upon the combing of textile materials; a medal and 1000 francs for the production of a substance to replace the albumen of eggs in making painters' canvas; 1000 francs for an albumen to replace the white of eggs in all industrial uses of the same; a silver medal and 500 francs for the best memoir on a new and advantageous method of constructing factory buildings; a silver medal and 500 francs for new theoretical and practical researches on the movement of steam in pipes; a silver medal and 500 francs for the invention and application of a registering pyrometer intended to show the temperature of the gaseous products of the combustion of coal in steam engines; a medal and 500 or 1000 francs (according to the importance of the work) for a memoir on electromotive force in mono- or poly-phase alternators. The remaining prizes are mostly medals, which will be awarded for advances in the industrial arts and for long service. All the prizes are open to every one except the members of the committees of the Société industrielle and the Council of administration. Competing memoirs must be sent, before February 15, 1898, to the President of the Society. A copy of the Programme des Prix will be sent upon application to the Secretary.

Jersey offers many opportunities for workers in the wide field of natural science. The Jersey Natural Science Association, which was founded on Thursday last, ought therefore, by organising the studies of the naturalists of the Island, to be of real assistance in scientific progress. The Island presents many important sections for the student of geology and mineralogy, while the work already done, in a quiet way by some of its inhabitants, indicates how a properly organised body of workers can advance natural knowledge. The new association has been instituted for the purpose of carrying on scientific research and cultivating the spirit of investigation by: (*a*) original papers or communications; (*b*) field work and excursions; (*c*) the delivery of popular scientific lectures when such can be arranged; (*d*) the formation of a museum and lending library for the use of members. The patron of the Association is Major-General E. Hopton, C.B. (the Lieut.-Governor of Jersey), and the officers are:—President, Dr. A. C. Godfray; Vice-Presidents, Mr. R. R. Lemprière (Viscount of Jersey), and Mr. H. E. Le V. dit Durell (Connétable of St. Helier); Hon. Treasurer, Mr. P. Asplet; Hon. Secretary and Librarian, Mr. C. A. Snazelle.

The death of Prof. Alfred Marshall Mayer, professor of physics in the Stevens Institute of Technology, Hoboken, N.J., on July 13, has already been announced in these columns. From an obituary notice in the *American Journal of Science* we extract the following particulars of Prof. Mayer's life and scientific work:—Prof. Mayer was born in Baltimore, Md., November 13, 1836, and received his education at St. Mary's College, Baltimore. After leaving this institution, in 1852, he spent two years in the office and workshop of a mechanical engineer, where he acquired a knowledge of mechanical processes and the use of tools, for which he had a natural aptitude. This was followed by a course of two years in a chemical laboratory, where he obtained a thorough knowledge of analytical chemistry. In 1856 he was made professor of physics and chemistry in the University of Maryland, and three years later he entered upon a similar position in Westminster College, Mo., where he remained two years. In 1863 he went abroad, and entered the University of Paris, where he spent two years in the study of physics, mathematics and physiology. While in Paris he was a pupil of the distinguished physicist Regnault. After his return to America he occupied a chair in Pennsylvania College, Gettysburg, and later in Lehigh University, Bethlehem, where he was in charge of the department of astronomy, and superintended the erection of an observatory. In 1869, an expedition was sent by the U.S. Nautical Almanac Office to Burlington, Iowa, to observe the eclipse of August 7. Prof. Mayer was placed in charge of the expedition, and obtained a large number of successful photographs. In 1871 he was called to the professorship of physics in the Stevens Institute of Technology, which position he held until the close of his life. Prof. Mayer was an enthusiastic and active investigator, and a prolific writer upon scientific subjects. He made numerous contributions to various journals, cyclopædias, and other scientific publications, but the memoirs in which he embodied the results of his own researches were chiefly published in the *American Journal of Science*. His papers published in that journal, since 1870, number forty-seven titles, covering nearly four hundred closely printed pages, not counting various notes and minor contributions. While embracing a great variety of topics in physics, his studies were more actively pursued in the departments of electricity and electro-magnetic phenomena, in optics, especially photometry and colour-contrasts, but more particularly in acoustics, which was a favourite field of research, in which his discoveries gave him the prominence and authority of a specialist. His acoustical researches form a connected series of papers, which together amount to nearly one-half the total volume of his contributions. Prof. Mayer received the degree of Ph.D. from the Pennsylvania College in 1866. In 1872 he was elected a member of the National Academy of Sciences, and was connected with many other scientific societies. He possessed great ingenuity and skill in construction, and a remarkable degree of delicacy and precision as an experimenter, which enabled him to obtain results that will have a high and permanent value in science.

A slight earthquake was felt at Hereford on Monday morning, July 19, between half-past three and four. Mr. E. Armitage, writing from Dadnor, Ross, Herefordshire, says that the disturbance was felt at 3.50 a.m. He adds: "The rumbling sound was accompanied by a distinct shock of momentary duration, sufficiently strong to awaken sleepers. The direction of the seismic wave was from east to west."

Mr. R. J. Ussher records in the *Irish Naturalist* the discovery of bones of the Great Auk in kitchen-middens on the coast of County Waterford. The bones have been determined as belonging to the Great Auk by Prof. Newton and Dr. Gadow: with them were found bones or horns of ox, goat, horse, pig, red deer, and domestic fowl; also an abundance of shells of oysters, cockles, mussels and limpets, with many pot-boilers or burned stones. It is pointed out that bones of this extinct bird have been found in the kitchen-middens of Denmark, in one or two places in Scotland, in Durham, and on the North American coast. More recently, they have been found on the County Antrim coast. Mr. Ussher's find corroborates this discovery, and shows that the range of the Great Auk extended in Ireland nearly as far south as 52° N. latitude.

A NUMBER of interesting navigational instruments were exhibited at the Fishmongers' Hall last week. The exhibition was organised by a sub-committee of the Shipmasters' Society, with Captain D. Wilson-Barker as chairman, and was principally intended to illustrate the progress that has been made in the art of navigation during Her Majesty's reign. Altogether there were about 200 exhibits, some of which are of historic importance. Included among these was a sextant, by Bird, said to have been used by Captain Cook. There was a well selected number of charts and navigation books, among the exhibitors in this section being Admiral Sir W. J. L. Wharton, F.R.S. The Meteorological Society lent several meteorological instruments such as are in use at sea, while in contrast with the quadrants, sextants, compasses, &c., which did duty in 1837, instruments of a more modern date were on view, comprising some of Lord Kelvin's inventions, such as the deflector for adjusting the compass without swinging the ship, the vertical force instrument, and the sounding machine. Sections were also devoted to ships' models and pictures, ancient charts and books, and ancient instruments.

THE Pilot Chart of the North Pacific Ocean for August, published by the American Hydrographic Office, contains a large amount of information useful to navigators. In addition to the usual arrows showing the prevalent direction and force of the wind and the drift of the currents, there is a forecast of the wind and weather which may be expected during the month, and also a chart showing the mean atmospheric conditions at Greenwich mean noon, any large variation from which may indicate a coming gale. As this is the season of maximum frequency of typhoons, as shown by the table compiled by Dr. Doberck, of the Hongkong Observatory for the thirteen years 1883–96, a special notice of these storms is given. Attention is drawn to the fact that the typhoon of the Western Pacific is in many respects the counterpart of the West Indian hurricane in the Atlantic. Both classes of storms have their origin in the vicinity of tropical groups of islands, and, under similar barometric conditions, both undergo the same slow development, and exhibit the same tendency to recurve upon reaching the northern limit of the north-east trades.

SOME facts of interest in connection with gold-washing on the Saskatchewan River are stated in the Report of the Geological Survey of Canada for 1895 (vol. viii. new series) just issued. The principal paying bars are found along the river within a distance of about sixty miles above and a similar distance below Edmonton. It is pointed out, however, that the occurrence of gold is not limited to the North Saskatchewan, the metal being found, in greater or less abundance, on portions of the courses of all the rivers east of the Rocky Mountains from the forty-ninth parallel northward.

THE auriferous character of the rocks of the Huronian system in Canada has been established by mining operations of recent years. The economic importance and generally metalliferous character of Huronian rocks was recognised by Sir William Logan in reports of the Canadian survey made nearly forty years ago. Referring to this, Dr. Dawson says in the latest report: "It is gratifying to observe that the practical miner is now beginning to appreciate the value of a large amount of geological work carried out in the country to the north of the Great Lakes, which, a few years ago, it might have appeared difficult to justify in the light of any economic results up to that time achieved. There can now be very little doubt that every square mile of the Huronian formation of Canada will sooner or later become an object of interest to the prospector, and that industries of considerable importance may yet be planted upon this formation in districts far to the north, or for other reasons at present regarded as barren and useless." The conclusions which Dr. Dawson arrived at as to the richness of the Yukon district, after his exploration of it in 1887, have lately been so strikingly established by the discovery of large quantities of gold on the Klondyke River, that his suggestions as to the commercial value of Huronian rocks will probably receive the attention of the mining world.

IN the *Bulletin de l'Académie des Sciences de Cracovie*, Dr. L. Natanson gives a kinetic theory of the equations of vortex-motion of fluids. This investigation is of special interest, inasmuch as it takes account of a certain molecular property to which the name "constraint of perturbations" (*coercition des perturbations*) has been applied. As long ago as 1845, the connection of the laws of vortex-motion with the principle of moments was pointed out by Sir G. G. Stokes. Dr. Natanson's paper may be said, in a certain sense, to be a development of this idea, in that he shows how the equations of Helmholtz and Nanson can be verified by supposing the so called "forces of constraint" to satisfy the equations of angular momentum.

A NEW cable recorder, invented by M. Ader, is described in *La Nature* of July 24. It consists essentially of a fine wire stretched vertically in a magnetic field created by a strong horizontal electro-magnet, the poles of which surround the wire. The currents from the cable traverse the wire, which moves to the right or left—that is, towards the north or the south pole of the electro-magnet—according to their direction. A shadow of the wire is projected across a slit, behind which a band of photographic paper travels. A black spot thus falls upon the paper, and as the wire moves to the right or left the movements are traced upon the photographic paper by the shadow of the spot, the result being a record similar to that given by the syphon recorder. The paper is developed automatically in three baths contained in a small dark chamber, and the signals are shown in white upon a black ground. As to the speed obtained, 350 letters a minute, that is, about seventy words, have been recorded through the cable between Marseilles and Algiers, and 150 letters per minute have been recorded upon the Brest-New York cable, the transmitter being at St. Pierre-Miquelon, and the receiver at Brest.

IN July of last year, Prof. Eschenhagen, of Potsdam, presented to the Berlin Academy a preliminary note on certain small variations of the earth's magnetism, which he had then detected for the first time. The apparatus then used consisted of a unifilar magnetometer, in which the magnet, a small steel mirror, was made to lie perpendicularly to the magnetic meridian by the torsion of the suspending quartz fibre. An account of further researches on the same subject is now given in the *Berliner Sitzungsberichte*. The most important oscillations have a period of about thirty seconds, and are observed chiefly between 6 a.m. and 6 p.m., *i.e.* roughly speaking, when the sun is above the horizon. Since October last waves of shorter period, lasting about twelve to fifteen seconds, have only been observed on two days, viz. November 7, 1896 and February 4, 1897; but these were of only half the amplitude of the normal waves. On several occasions, however, groups of waves were observed which could readily be accounted for by interference, as they closely resembled beats in acoustics. From observations made at Potsdam and Wilhelmshaven, it seems probable that the same disturbances take place almost simultaneously over a considerable area, but further observations are required in confirmation of this point. The cause of the phenomenon is uncertain, but Prof. Eschenhagen inclines to the view that it is of atmospheric origin, in conformity with Schuster and Von Bezold's theories of the diurnal variations. The author finally suggests a convenient means of detecting these rapid fluctuations by observing the induced currents in a sufficiently large coil, a method which has the advantage of practically eliminating disturbances of long period.

THE first number of a new quarterly botanical journal has made its appearance, with the title *Bollettino del Reale Orto Botanico di Palermo*, under the editorship of Prof. Borzì, intended as a record of the work done in the Botanical Garden and Botanical Institute at Palermo. Among the articles in the number already published are: A new genus of Cactaceæ, *Myrtillocactus*, by M. Console; Experiments on acclimatisation; and some new and critical species of Liliaceæ, by Prof. Borzì; species of *Agave* described within the last ten years, by A. Terraciano.

THE most recent of the series of "Hand-lists" of plants in cultivation in 1897 at the Royal Gardens, Kew, comprises the tender Monocotyledones (excluding the Orchids). The preface contains a general description of the collection, under the heads of the different natural orders, Scitamineæ, Bromeliaceæ, Palmæ, Pandanaceæ, Aroideæ, &c. It will probably surprise many who are unacquainted with the extent of our national collection to hear that there are now under cultivation at Kew upwards of 400 species of Palm, and 360 Aroids. The collection of Palms is probably the largest in the world.

THE question as to the age of the dicotyledons is one of great importance, and any new facts which may be brought to light are therefore looked upon with great interest. In the *Proceedings* of the Linnean Society of New South Wales (for March 31), the president, Mr. Henry Deane, in his address to the Society, makes an interesting reference to the earliest dicotyledons in the northern hemisphere and in Australia. It may be mentioned, however, that up to 1888 the oldest known dicotyledon was one from the Middle Cretaceous of Greenland, described by Heer under the name of *Populus primæva*. In the same year Prof. Fontaine found in some of the Lower Potomac series—in what was supposed to be Jurassic—some portions of leaves resembling dicotyledons, but not easily distinguishable from the lower groups, ferns, cycads, and other gymnosperms. Further discoveries of known flora have been found in Potomac formation, and an unbroken series from the oldest to the newest beds have been brought to light, and in the latter the dicotyledonous element largely predominated.

As regards their occurrence in old beds in Australia, Mr. Deane says:—"The fossils of the Oxley beds are well developed dicotyledons, quite equal in development to those found in the Upper Cretaceous in Europe and North America. The Oxley beds are near the top of the Ipswich Coal Measures, which are supposed to be at latest Jurassic in age. The difficulty of reconciling the fact of the full development of the dicotyledonous type in Australia with the very archaic rudimentary types of the same age in North America, which are mentioned by Lester Ward, struck me very forcibly, and as in the western parts of the colony it had been shown that the Lower Cretaceous beds lie conformably, or at an angle not distinguishable, upon the beds below them." Mr. R. L. Jack's opinion of these beds is that he believes them "to be below the thick Murphy's Creek Sandstone and the Clifton Coals and Shales . . ." and he cannot see his way to put "the Oxley beds on a higher horizon than the rest of the Ipswich formation." Mr. Deane concludes that the above views "point undoubtedly to the conclusion that at an age when European and American dicotyledons exhibited a rudimentary or transition character, the southern hemisphere already possessed types of high development. Before this becomes an accepted fact, it is needless to say that some further corroboration of the conclusions as to the correspondence in age of the so-called Jurassic beds of Australia and those of the northern hemisphere should be sought."

THE Annual Report, just received, of the Manchester Microscopical Society for 1896 furnishes evidence of useful work done in the northern capital. There are good papers in several departments of botany and zoology, as well as one on "The New Light and the New Photography."

The Photogram for the present month will be found to contain many short articles of interest, and several notes of useful hints. With regard to kinetography we read, "the greatest kinetographic success of the Jubilee was scored by the *Bradford Argus* and by their kinetographers, R. J. Appleton and Co. Both good management and good luck seem to have befriended them, for the eclipsing parasol of Her Majesty the Queen was raised just as she passed their stand, and a happy smile (duly recorded) passed over the royal countenance. A van specially fitted for developing, printing, &c., was attached to one of the trains to Bradford, and by midnight on the 22nd the view of the whole procession was projected on to a screen facing Forster Square, which was thronged by thousands of people." Have many of our readers used the Ilford Special Rapid Plates? These are very quick plates indeed, and require only about a fourth of the time of exposure of the ordinary plates. If a person is used to slow plates, these rapid ones must be handled with care. The tendency should be to try to rather under- than over-expose them; the developer should not be too strong at first, and should be kept well under control. They should also during development be placed in the dark. Accompanying a few words on "A Notable Photographer," are two excellent reproductions from negatives taken by Mr. H. Walter Barnett.

THE following are among the articles, and other publications, which have come under our notice during the past few days:—"The San José Scale and its Nearest Allies," by Prof. T. D. A. Cockerell, published by the U.S. Department of Agriculture (Division of Entomology), Technical Series, No. 6. The information given in this bulletin will enable all entomologists, and every one else who has access to a compound microscope, to distinguish definitely between the San José scale and its closest allies.—The New York *Nation* is publishing a series of articles upon the Schools of Archæology at Athens, by J. R. S. Sterrett.—The second part of a valuable report on the valley regions of Alabama (Palæozoic Strata), by Henry McCalley, has been published by the Geological Survey of that State, under the direction of Dr. E. A. Smith. Part i. dealt with the Tennessee Valley region, and Part ii. is concerned with the resources of the Coosa Valley region. The report is illustrated with a number of fine reproductions of photographs, and contains a mass of information upon the physical features, geology, natural resources, soils, agricultural features, timber, water-power, climate, health, rainfall and drainage of Alabama.—The metamorphosis of a dragon-fly is described by the Rev. A. East, in the August number of *Knowledge*, and is illustrated with reproductions of six striking photographs of different stages of emergence of the insect from the nymph skin.—The official report of the International Meteorological Conference, held at Paris last September, and reported in NATURE at the time (vol. liv. p. 624), has just been published by authority of the Meteorological Council. Among the subjects and authors of papers appended to the report are:—"The Centres of Action of the Atmosphere," by Prof. H. H. Hildebrandsson; "Simultaneous Magnetic Observations," by Dr. Eschenhagen; "The Registration of Atmospheric Electricity," by M. A. Chauveau; "The Reduction of Anemometrical Data," by Dr. Sprung; "The Employment of the Hypsometer to determine the Pressure of the Air and the Gravity Correction for Mercurial Barometers," by Prof. Mohn; "International Co-operation in prosecuting work and publishing results in Ocean Meteorology," by Dr. Neumayer.

THE additions to the Zoological Society's Gardens during the past week include a —— Genet (*Genetta* ——) from South-east Brazil, presented by Mr. J. E. Matcham; a Guinea Baboon (*Cynocephalus sphinx*, ♂), two White-collared Mangabeys (*Cercocebus collaris*, ♂ ♀), a Moustache Monkey (*Cercopithecus cephus*, ♂), from West Africa, presented by Dr. H. O. Forbes; two Tawny Owls (*Syrnium aluco*), European, presented by Mr. T. Guittonnean; a Natal Python (*Python natalensis*) from Natal; a Green-necked Touracou (*Gallirex chlorochlamys*) from East Africa, presented by Mr. W. Champion; a Horned Lizard (*Phrynosoma cornutum*) from Texas, presented by Mr. G. J. W. Vickers; two Common Chameleons (*Chamæleon vulgaris*) from North Africa, presented by Major Spilsbury; four Black-eared Marmosets (*Hapale penicillata*) from South-east Brazil, a Green-cheeked Amazon (*Chrysotis viridigena*) from Columbia, two —— Terrapins (*Clemmys* ——), deposited; three Bennett's Wallabies (*Macropus bennetti*, ♂ ♂ ♀), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

SUNSPOTS AND THE MEAN YEARLY TEMPERATURE AT TURIN.—In a small memoir entitled "Sulla relazione fra le Macchie Solari e la Temperatura dell' aria a Torino," Dr. G. B. Rizzo shows in a striking way the effect of the relative frequency of solar spotted area on the Turin temperature. For this investigation he has been able to employ a continuous series of observations, commencing from the year 1752 to the present time, made by Prof. Ignazio Somis, the R. Accademia delle Scienze, and the Astronomical Observatory of Palazzo Madama. The resulting numbers show that not only is the eleven-yearly period plainly marked, but that a well observed "lag" of the temperature is displayed by the observations

Forming the two equations, the first giving the relative frequency of solar spots, namely,

$$r = 46{\cdot}31 + 20{\cdot}70 \sin (184^\circ 24' + z),$$

and the second the relative change of temperature, namely,

$$t = 21{\cdot}85 + 0{\cdot}22 \sin (94^\circ 53' + z),$$

where z represents the distance in arc from the beginning of an eleven-year period, and forming the differences from the mean value of the whole period, the following table shows the variation recorded.

Year of period.	Deviations from the mean	
	Spots.	Temperature.
1	− 7·34	+ 0·21
2	− 16·64	+ 0·13
3	− 20·65	+ 0·01
4	− 18·11	− 0·11
5	− 9·82	− 0·19
6	+ 1·59	− 0·22
7	+ 12·50	− 0·17
8	+ 19·42	− 0·07
9	+ 20·20	+ 0·05
10	+ 14·56	+ 0·16
11	+ 4·29	+ 0·22

The author's summary of the investigation leads him to the following conclusion:—

The eleven yearly variations of the sunspots and the mean temperature at the earth's surface are due to some periodic cause, which acting at the sun increases the spots, and on our planet increases the temperature, with a retardation in time of a quarter of this period; on the other hand, a similar cause acts on the earth diminishing the temperature, and on the sun increasing the spots with a like retardation.

RECENT CONTRIBUTIONS TO ASTRONOMY.—Among some of the astronomical pamphlets we have received recently, may be mentioned the following:—"Connaissance des Temps" for the year 1899. Among the additions to this volume one may refer to the epochs for the elongations of the fifth satellite of Jupiter; a series of elements from which can be calculated the exact positions of the satellites of Mars, Saturn, Uranus and Neptune, in which the unpublished results of the researches of M. H. Struve are employed. There is also a table giving the ecliptic elements of the major planets, their satellites, and of Saturn's ring. Of the eclipses mentioned two partial ones occur, the first on January 11 and the second on June 9; the latter is of interest, as it will be visible from Paris.—A pamphlet entitled "Enquêtes et Documents relatifs à l'enseignement supérieur" (vol. lxii.) contains the reports of the different directors on the provincial French observatories for the year 1898. Among those to which reference is made are: Algiers by M. Ch. Trépied, Besançon by M. L. J. Gruey, Bordeaux by M. G. Rayet, Lyons by M. Ch. André, Marseilles by M. Stephan, Toulouse by M. B. Baillaud, and the observatory of Pic du Midi de Bigorre by M. Marchand.—Another publication of interest and utility is that due to the late Dr. E. J. Stone, consisting of tables for facilitating the computation of star-constants. These have been modified and revised by Prof. H. H. Turner, the Savilian Professor of Astronomy at Oxford. Prof. Turner, with the aid of a grant from Miss Bruce, to whom astronomy is very much indebted, has certainly simplified the use of the tables, and they have now been printed in three-figure form which, after considerable use at Greenwich, give satisfactory results "both as regards saving of time and retention of all needful accuracy." We may mention that Prof. Turner has done away with the use of the constants m, n and tan ω, so that the tables will by this alteration be suitable for any epoch.

THE AUGUST METEORS.—As we go to press the swift moving August meteors will be speeding through our atmosphere, rendering themselves luminous to us according as they pass within or without this envelope. As they originate from a point situated near η Persei, lying in the north-eastern part of the heavens, and rather low down in the sky in the earlier part of the evening, the longest trails should be looked for down in the south-western quadrant of the heavens. A long watch on Monday evening from 9 p.m. to 2 a.m. resulted in the observation of only a few real Perseids, though there were several of those which ordinarily would be termed "sporadic," but which, according to that energetic observer Mr. W. F. Denning, would be attributed to fixed radiant points of minor importance. Two cameras pointed to the Cassiopeiæ and Perseus regions of the heavens, and exposed for considerable lengths of time, were not fortunate enough to catch any of the trails. Perhaps other observers elsewhere have been more fortunate. The night, however, was at times very fine, especially after midnight. The moon, being low down in the southward, did not interfere to any extent with the photographic effects. Clouds prevented work at several stations on Tuesday night.

THE ALGOL VARIABLE Z HERCULIS.—Dr. Ernst Hartwig, writing to the *Astronomischen Nachrichten* (No. 3437) about the Algol Variable Z Herculis, draws attention to the fact that this interesting variable is now conveniently situated for good comparisons. From observations of the diminution of the light alone in the first half of the month of June, using the 1894 light curve, it was found that the times for the principal minima differed only a few minutes from the ephemeris given in the *Viertel Jahrschrift*, while the times of the occurrence of the secondary minima, in which the star is only a third of a magnitude below its general brightness, occurred twenty minutes later than the computed times. The length of period, which was published in a previous number of the *Astronomischen Nachrichten* (No. 3260), and the ephemeris based on this, is thus found to be correct to a few seconds.

REPRODUCTION OF COMETARY PHENOMENA.—The following brief notice appeared in the *Times* of August 5:—"A Reuter telegram from Berlin of yesterday's date says: 'According to a communication made by the Royal Observatory, Prof. Goldstein, of this city, has succeeded in experimentally reproducing by means of kathode rays certain very distinct and characteristic cometic phenomena, such as the radiation of light from the head of a comet and the resultant development of a tail. He has also been able by these means to account for certain peculiarities of this class of phenomena which have been observed in recent years.'"